

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

In re Patent Application of

Atty Dkt. 550-269

C# M#

ROHR et al

TC/A.U.: 1753

Serial No. 09/955,297

Examiner: Brian Mutschler

Filed: September 19, 2001

Date: February 23, 2006

Title: PHOTOVOLTAIC DEVICE

Mail Stop Appeal Brief - Patents

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

☐ **Correspondence Address Indication Form Attached.**

☐ **NOTICE OF APPEAL**

Applicant hereby **appeals** to the Board of Patent Appeals and Interferences

from the last decision of the Examiner twice/finally rejecting applicant's claim(s). \$500.00 (1401)/\$250.00 (2401) \$

☐ An appeal **BRIEF** is attached in the pending appeal of the above-identified application \$500.00 (1402)/\$250.00 (2402) \$

☐ Credit for fees paid in prior appeal without decision on merits -\$ ()

☒ A Further Supplemental Reply Brief is attached. (no fee)

☐ Petition is hereby made to extend the current due date so as to cover the filing date of this paper and attachment(s)
One Month Extension \$120.00 (1251)/\$60.00 (2251)
Two Month Extensions \$450.00 (1252)/\$225.00 (2252)
Three Month Extensions \$1020.00 (1253)/\$510.00 (2253)
Four Month Extensions \$1590.00 (1254)/\$795.00 (2254) \$

☐ "Small entity" statement attached.

Less month extension previously paid on -\$ ()

TOTAL FEE ENCLOSED \$ 0.00

Any future submission requiring an extension of time is hereby stated to include a petition for such time extension. The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our **Account No. 14-1140**. A duplicate copy of this sheet is attached.

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By Atty: Stanley C. Spooner, Reg. No. 27,393

Signature: 



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FURTHER SUPPLEMENTAL REPLY BRIEF
PURSUANT TO 37 CFR §41.50(A)(2)(ii)

This Further Supplemental Reply Brief is responsive to the second Supplemental Examiner's Answer mailed December 23, 2005 (the previous Supplemental Examiner's Answer being mailed August 8, 2005).

Again, in view of the Examiner's failure to respond to the Board's remand requirements and failure to respond to points raised in the previously submitted Supplemental Reply Brief (filed October 7, 2005), issue is taken with a number of new statements, issues and suppositions set out in the Supplemental Examiner's Answer and they are responded to in the approximate order in which they are raised by the Examiner.

Additionally, it is noted that this Appeal was noted on May 12, 2004 (almost two years ago) and was previously set for Oral Hearing in May 2005, but was pulled from the

Oral Hearing and remanded to the Examiner on the Board's Order of May 31, 2005 due to the Examiner's previously noted failures to respond to the points raised in the Appeal Brief and in the Rule 132 Declaration of an expert. The Examiner's failures has clearly delayed the consideration of this appeal. Moreover, the submission of an unauthorized Supplemental Examiner's Answer (the second filed December 23, 2005) has further delayed consideration of this appeal.

Appellants respectfully request that an Oral Hearing on this appeal be held at the earliest possible opportunity in order that Appellants may receive a decision on a Notice of Appeal that was filed almost two years ago.

1. Where the cited prior art does not actually teach the structure of the claimed invention, the Examiner now resorts to inherency

On page 2 of the "Response to Argument" under section 1, the Examiner quotes a number of the Appellants' arguments (pointing out that the Examiner has raised a new issue with respect to his "inherency" argument). However, rather than responding to any of the allegations set out in those quotes, the Examiner merely states that "Appellant's arguments are not deemed persuasive." The Examiner then denies that he has raised a new issue (sentence bridging pages 2 and 3) and concludes that the resort to inherency is "further rationale in support of the rejection based on Ekins-Daukes et al" (hereinafter "ED I").

Appellants' previously filed Appeal Brief, Reply Brief and first Supplemental Reply Brief all demonstrate that ED I teaches nothing about the composition of layers in

a photovoltaic device as claimed in the present application, especially where a "period of one tensile strained layer and one compressively strained layer exerts substantially no shear force on a neighbouring structure." This structural interrelationship statement in Appellants' claim 1 has not been disputed as being indefinite or otherwise improper under §112. Therefore, in order to anticipate or render obvious, the burden is on the Examiner to show that the cited prior art reference teaches this structure and structural interrelationship.

Appellants' previous Appeal Brief, Reply Brief and first Supplemental Reply Brief have all stressed that at no time in any Official Action, Examiner's Answer or Supplemental Examiner's Answer has the Examiner indicated how or where ED I contains a teaching that the layers "exerts substantially no shear force on a neighbouring structure."

The Examiner, apparently conceding that there is no disclosure of such claimed layers in the ED I reference, alleged for the first time in the first Supplemental Examiner's Answer that such disclosure was somehow "inherent" in the ED I reference. While the Examiner suggests that this is not a new issue and it is merely "further rationale in support of the rejection based on Ekins-Daukes et al," the fact of the matter is that there is simply no disclosure of the claimed relationship between layers which form Appellants' claimed photovoltaic device.

Appellants note that the Manual of Patent Examining Procedure (MPEP) at Section 2144.03 indicates that an examiner may allege that something is "well known" to those of ordinary skill in the art and may take Official Notice of facts outside the record.

This is because, if challenged, the Examiner should be able to provide clear supporting evidence of the officially noted fact. However, where the applicant traverses such an assertion, the MPEP requires that "the examiner should cite a reference in support of his or her position." (Section 2144.03).

Appellants' first Supplemental Reply Brief points out that the Examiner has failed to meet his duty to provide any evidentiary support and thus the "inherency" allegations need not be further rebutted. The Examiner's attempt to characterize these, not as a new issue, but as "further rationale" does not change the fact that he has provided no evidentiary support for his position that the "no shear force" claim limitation is somehow inherently disclosed in the ED I reference.

As a result, the Examiner has simply not met the initial threshold requirement of a rejection under §102 or §103, i.e., that a prior art reference, by itself or in combination with other prior art references, teaches each and every structure and interrelationship between structures as set out in Appellants' claims.

2. The Examiner does not dispute "strain is not the same as stress" and admits that "if two materials have different Hooke's Law constants k , i.e., k_1 and k_2 and if those materials are strained the same amount [zero strain] . . . , the resultant stress will be different" (sentence bridging pages 3 and 4 of the second Supplemental Examiner's Answer)

The Examiner does not dispute that "strain is not the same as stress" by way of his previous admission that "Appellant's arguments are well taken." (first Supp. Exr. Ans., page 2, section 1). Additionally, in the sentence bridging pages 3 and 4 of the second

Supplemental Examiner's Answer, the Examiner "agrees with appellant that if two materials have different Hooke's Law constants k , i.e., k_1 and k_2 and if those materials are strained the same amount[,] due to a difference in Hooke's law constant, the resultant stress will be different."

Thus, not only is strain not the same as stress (and thus zero strain is not the same as zero stress), the Examiner admits that even if zero strain is achieved, if there is a difference in Hooke's Law constant, "the resultant stress will be different." Thus, if ED I teaches a zero average strain, the resultant stress would only be zero if the materials had identical Hooke's Law constants.

Appellants' specification discloses that ED I, recognizing the differences in Hooke's Law constants in the material composition of the layers, is directed towards solving the problem by "strain-balancing the layers" (see page 3, lines 4-7). Appellants' specification goes on to state at page 3, lines 17-22, that the present invention, rather than seeking to provide an average lattice constant that matches the substrate (if the lattice constant of the layers in a period are the same as the substrate's lattice constant or if the Hooke's Law constants are the same in the substrate and the wells and barrier materials throughout the device, then the zero average strain would imply zero average stress), recognizes that it is the force (stress) balancing that is important. As stated in the originally filed Appellants' specification "a device providing an average lattice constant matching the substrate may still allow a significant build up of stress that will result in undesirable dislocations." (Specification page 3, lines 20-22).

Again, in view of the above admissions made by the Examiner, it is clear that there is no teaching in ED I of any desirability for making a photovoltaic device having tensile strained layers and compressively strained layers which have compositions that "exert substantially no shear force on a neighbouring structure." The Examiner simply continues to avoid pointing out where this claimed structural interrelationship is disclosed or obvious to one of ordinary skill in the art in view of the ED I reference.

3. The Examiner continues to attempt to put the burden of explaining the Ekins-Daukes I reference on the Appellant rather than meeting his own burden of showing where ED I teaches "no shear force on a neighbor"

On page 4, lines 3-6, the Examiner restates his earlier conclusion that "[a]ppellant has not shown there would be a substantially difference in Hooke's law constant for the GaAs, GaAs_{0.939}P_{0.061} barrier and In_{0.17}Ga_{0.83}As well so that there would be substantial shear force."

The Examiner has cited neither case law nor MPEP practice which places on the Appellant any burden of proving that a cited prior art reference teaches. This burden is on the Examiner and only shifts to Appellant when the Examiner has made a *prima facie* showing. As the Examiner has not made any showing, let alone a *prima facie* showing, the burden remains on the Examiner to show how or where the ED 1 reference contains the "no shear force" teaching he contends is present.

As noted above, the Examiner cannot point to any teaching in ED I suggesting "no shear force" and, instead, has to rely solely upon his allegation of "inherency." However,

he has been unable thus far to provide any evidence supporting his inherency argument. Therefore, the burden is on the Examiner and he has failed to meet this burden of showing that the prior art reference shows the claimed feature.

Moreover, the ED I reference itself contains a recognition that there is a substantial difference in Hooke's Law constant for the materials used, contrary to the Examiner's contentions. The problem is stated in the second paragraph on page 4195 which reads:

[w]hen strained InGaAs QWs are added to a GaAs structure, the short circuit current (I_{SC}) is increased. However, the lattice mismatch places an upper limit on the number of QWs that can be accommodated before strain relaxation takes place, comprising the open circuit voltage (V_{OC}).

The above statement clearly indicates that with strained InGaAs quantum wells used in conjunction with a GaAs substrate, there is a problem caused by lattice mismatch. Lattice mismatch translates into lattice strain as a result of the epitaxial growth. The ED I reference, after establishing the problem, goes on to teach its particular solution to that problem, i.e., to create a photovoltaic device utilizing a plurality of quantum wells where the "compressive strain in the InGaAs QW is matched by tensile strain in GaAsP barriers, overcoming the lattice-mismatch limitation." (ED I page 4125). ED I calls this a "Strain-Balanced GaAsP/InGaAs Quantum Well Solar Cell" in the title of the article.

Thus, there is no need for the Appellants to show that there would be a "substantial difference" in Hooke's Law constant for the components of the ED I reference, since the reference itself points out that there is a substantial lattice mismatch which clearly indicates that there is a substantial difference in Hooke's Law constant.

Thus, ED I clearly demonstrates to those of ordinary skill that there are variations in Hooke's Law constants in the materials used and attempts to solve those problems by "strain-balancing." Moreover, as noted above, the burden is not on the Appellant to prove a difference in Hooke's Law constant in the ED I reference, but rather the burden is on the Examiner to establish where the ED I solution of using "strain-balancing" teaches Appellants' "no shear force on a neighbouring structure" interrelationship to solve the problem. The Examiner has simply failed to meet his burden of proof.

4. The Examiner speculates that there would be "very little difference in lattice constants" in the ED I reference

The Examiner repeatedly states that "[s]ince there is very little difference in lattice constants, there is going to be 'substantially no shear force' on neighboring structures, as here claimed" (page 3, lines 10-12, by Appellants' count this "very little difference" phrase is used at least seven other times in the second Supplemental Examiner's Answer). The Examiner provides no support for his conclusion that there is "very little difference" and perhaps believes if he states this repeatedly, the Board will believe the allegation.

Instead, it appears that the Examiner assumes that there is very little difference, and, as a result, there is "substantially no shear force." However, the Examiner does not know and does not provide any indication of how or why he reaches this conclusion. Regardless of how the Examiner rationalizes his statement, the Examiner still ignores the problem stated in ED I, i.e., "lattice mismatch" which, as stated in ED I, places an "upper

limit on the number of QWs that can be accommodated before strain relaxation takes place."

When queried as to how or why the Examiner believes there to be "very little difference in lattice constants," the Examiner relies solely upon his "inherency" argument and instead tries to shift the burden to Appellants to show the difference of lattice constants in the components used in ED I. The burden is not on the Appellants to make such a demonstration. However, it is enough for the Appellants to point out that ED I recognizes the problem caused by the use of components which create that problem, but teaches a different solution to the problem, i.e., providing a "strain-balanced" approach. Thus, the Examiner's assumption of "very little difference" is unsupported and even if true, does not indicate that ED I anticipates or renders obvious the solution of Appellants' independent claim 1.

5. The Examiner contends that "Appellant should show that such a difference in lattice constants [in ED I] will not permit the claimed limitation of 'substantially no shear force' to be met"

The Examiner alleges in the last sentence on page 4 of the second Supplemental Examiner's Answer that the burden is on the Appellants to "show that such a difference in lattice constants will not permit the claimed limitation of 'substantially no shear force' to be met." As noted above, absent a *prima facie* case, the burden of proving the claimed invention obvious or anticipated remains with the Examiner. He has not shown where the prior art ED I reference teaches "substantially no shear force."

Moreover, even if the Examiner is correct in his unsupported assumptions, appellants have provided the Declaration of Dr. Neil G. Anderson, who in his Declaration, is clearly qualified as an expert in the field of the claimed invention. Dr. Anderson has absolutely no connection with Appellants or the Assignee of this invention, (other than they are professional acquaintances in the field of multiple quantum well cells) and thus is clearly an independent expert, whose opinion testimony must be taken as fact by the Examiner. Specifically, paragraph 12 of Dr. Anderson's Declaration, inasmuch as this is opinion testimony of an independent expert, must be taken as fact evidence by the Examiner, especially if the Examiner offers no fact evidence to the contrary.

Paragraph 12 specifically states, in answer to the Examiner's challenge "Appellant should show that a difference in lattice constants," that using the ED I approach to create a photovoltaic device is "insufficiently exact" to ensure periods which exert substantially no shear force on a neighboring structure as required by Appellants' claims.

The Examiner argues both here and later that the claims are not directed to method steps and therefore even if the methods of claim 1 and ED I are different, they create the same resulting apparatus. Paragraph 12 of the Anderson Declaration clearly states that the method of ED I is "insufficiently exact" to create an apparatus which has the claimed interrelationship of layers, i.e., "a period of one tensile strained layer and one compressively strained layer exerts substantially no shear force on a neighbouring structure." Thus, the photovoltaic devices disclosed in ED I are made by the method disclosed in ED I and that method is "insufficiently exact" to create a structure which has

the structural interrelationship recited in Appellants' independent claim 1, i.e., a quantum well which "exerts substantially no shear force on a neighbouring structure."

As a result, even though the burden is not on the Applicant to prove the Examiner's suppositions to be incorrect, paragraph 12 of the Anderson Declaration does just that and confirms that the ED I reference does not disclose or create a device which falls within the scope of Appellants' independent claim 1 or any claim dependent thereon.

The Examiner contends that "the instant claims are apparatus claims, and Ekins-Daukes et al teaches the same apparatus." (Sentence bridging pages 7 and 8). Quite clearly, the Examiner is again in error because the expert Declaration of Dr. Anderson confirms that the "Ekins-Daukes I disclosure . . . is insufficiently exact" to create the structure claimed in Appellants' independent claim 1. The fact evidence of Dr. Anderson's testimony clearly trumps the Examiner's unsupported "inherency" arguments.

6. The Examiner apparently also overlooks paragraphs 10 and 11 of the Anderson Declaration

It should be noted that the Examiner has not traversed nor has he supplied any evidence controverting paragraphs 10 and 11 of the Anderson Declaration. Dr. Anderson did read the Examiner's Official Action, did read the ED I reference and did read and review the specification and claims of the present application as confirmed in paragraph 2 of his Declaration.

In paragraph 10, Dr. Anderson states that "the Examiner's suggestion that every element set out in [claim 1] is present in the [ED I] reference . . . is incorrect." Thus, Dr. Anderson clearly reviewed the elements which are recited in independent claim 1 and the elements which are disclosed in ED I and concluded that the Examiner's statement that they were anticipated was "incorrect." Thus, Dr. Anderson has considered the various layers disclosed in the ED I reference and the disclosed interrelationship and concludes that the Examiner's view is "incorrect."

The Examiner also ignores the evidence provided by Dr. Anderson's Declaration in paragraph 11, where Dr. Anderson states that "the Examiner errs in his conclusion that the requirement of claim 1 that 'a period of one tensile strained layer and one compressively strained layer exerts substantially no shear force on a neighbouring structure' is ensured by the Ekins-Daukes I disclosure of a thickness-weighted average lattice constant approach as in equation 1 of Ekins-Daukes I." In short, the Examiner's conclusion, that the claim 1 structure and structural interrelationship is ensured by ED I, is erroneous. The Examiner offers no fact evidence to controvert either paragraph 10 or 11 of Dr. Anderson's Declaration.

The only conclusion that can be reached by reviewing paragraphs 10 and 11 of the Anderson Declaration is that the Examiner has either misconstrued what is required by Appellants' independent claim 1 or he misunderstands what is taught by the ED I reference, or both. The Examiner's rationale for the errors he made is not for the Appellants to speculate. However, positive expert testimony has been supplied which

confirms that the Examiner has made those errors and mistakes, and therefore any *prima facie* case of anticipation or obviousness is clearly rebutted by the Declaration.

7. The Examiner's failure to fully consider and give proper weight to the expert Declaration of Dr. Anderson

Beginning at section 5 on page 14, the Examiner restates Appellants' observations that Dr. Anderson is an expert and that the Examiner has not questioned the veracity of Dr. Anderson's statement, and that the Examiner does not dispute either of these statements. The Examiner merely concludes that he fully addressed the Declaration in both the Final Rejection and in the Supplemental Examiner's Answer.

The Examiner's summary dismissal of the facts presented in the Declaration of Dr. Anderson as "not deemed to be persuasive" (Supplemental Examiner's Answer page 14) does not dispute any paragraph in the Declaration. While the Rule 132 Declaration of Dr. Anderson was submitted with a Rule 116 Amendment filed July 22, 2003, the Board of Appeals remanded the case to the Examiner on May 31, 2005 in order to specifically answer the questions as to whether Dr. Anderson's Declaration had been considered and specifically directed the Examiner to respond to the Anderson Declaration, as well as Reply Brief Exhibit 1.

Clearly, the Board remanded because it did not believe that the Examiner properly responded to the Anderson Declaration "in the Final Rejection mailed 01/21/2004" or the Examiner's Answer, as contended by the Examiner.

As noted in the previously filed Supplemental Reply Brief, a review of the August 9, 2005 Supplemental Examiner's Answer (filed in response to the remand) confirms that the only mention of Dr. Anderson's Declaration is in the paragraph bridging pages 5 and 6, and this is only a mention of paragraph 12. There is no mention of any error in any paragraph of the Declaration. There is no evidence presented which calls into question or disputes any portion of any paragraph in the Declaration.

Instead of responding by pointing out errors in the declaration and/or presenting contrary evidence (as opposed to the Examiner's "inherency" argument), the Examiner merely states that "paragraph 12 does not address the exact solar cell prepared in Ekins-Daukes et al." This statement does not explain how the Anderson Declaration paragraph 12 reference to "the Ekins-Daukes I disclosure" is not a reference which includes "the exact solar cell prepared in Ekins-Daukes et al." In fact, Dr. Anderson, at paragraph 2 in his Declaration, testifies that he considered the "below-cited prior art references" and in paragraphs 10-12 he identifies the "Ekins-Daukes I disclosure" as being specifically considered. Thus the evidence is that Dr. Anderson's testimony in the Declaration was about the "exact solar cell prepared in Ekins-Daukes et al."

Additionally, as explained in the Anderson Declaration at paragraphs 10 and 11, the Examiner's conclusion that the elements set out in claim 1 are disclosed in the ED I reference is "incorrect," and the Examiner's conclusion that the requirement of "substantially no shear force on a neighbouring structure" is ensured by the ED I disclosure is an erroneous conclusion.

Given these two major errors, it is clear, at least in the expert opinion of Dr. Anderson, that the Examiner's obsession with learning about "the exact solar cell" prepared in ED I bears no relevance on whether ED I teaches the claimed elements of Appellants' independent claim 1.

Therefore, Appellants remain of the opinion that the Examiner has failed to comply with the Board's remand requirement of "a rebuttal of appellants' arguments concerning the Anderson declaration of record as well as the reply brief exhibit (if entered)." The Examiner entered the Reply Brief Exhibit 1 and, because the Reply Brief exhibit was never intended to be an exact duplicate of the Ekins-Daukes reference, the observation that it is not identical to ED I is irrelevant. The Exhibit merely demonstrates how the use of the strain balanced technique of ED I can still result in a quantum well cell that still has the problem of stress differences causing dislocations (which are detrimental to the performance of the claimed photovoltaic devices).

Appellants, in this Further Supplemental Reply Brief, do not specifically respond to each and every argument which the Examiner makes in his Second Supplemental Examiner's Answer in order to conclude that the Appellant's submissions are "not persuasive." Many of the arguments include repetitions of portions or all of the above arguments. However, it would appear clear that the Examiner cannot respond to the evidence of record which clearly establishes that ED I does not disclose any structure or method of making a structure in which layers exert "substantially no shear force on a

neighboring structure." Appellants do believe that the major arguments and new issues raised in the second Supplemental Examiner's Answer have been fairly treated above.

SUMMARY

Therefore, as set out in the Appeal Brief filed July 12, 2004, the Examiner has not identified any prior art reference that teaches Appellants' claimed structural interrelationship of a period which "exerts substantially no shear force on a neighboring structure." A simple reading of the ED I reference confirms that, instead of the presently claimed invention, it teaches the strain-balanced approach. This reading of ED I is confirmed by the expert testimony of Dr. Neil Anderson. The Examiner has identified no evidence of record tending to dispute or question any statement made by Dr. Anderson in his Declaration. Because the burden is on the Examiner to establish where or how a prior art reference teaches or renders obvious every structural element and interrelationship between elements set out in Appellants' independent claim, he has failed to point out where the prior art teaches "substantially no shear force on a neighbouring structure" and this failure is confirmed by Dr. Anderson's expert testimony. There is simply no support for the rejection of Appellants claims in the ED I reference.

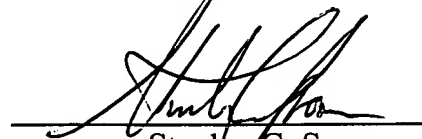
In view of the above, and in view of Appellants' Appeal Brief, Reply Brief and previously filed Supplemental Reply Brief, all currently of record, the rejection of claims 1-18, 20-27, 31-33 and 35-38 is clearly improper and these claims are clearly patentable over the cited prior art. A reversal of the rejection by this Honorable Board is respectfully requested.

ROHR et al
Serial No. 09/955,297

Respectfully submitted,

NIXON & VANDERHYE P.C.

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